

## SPHERES Autonomy and Identification Testbed, Phase II

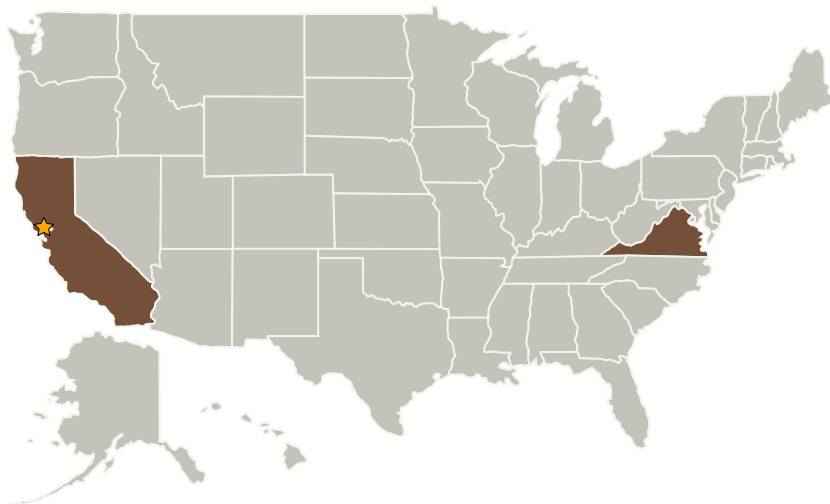
Completed Technology Project (2005 - 2007)



## Project Introduction

Many future space missions involve formation flying spacecraft performing imaging, inspection, assembly, and servicing missions. Having multiple spacecraft in close proximity undergoing comparatively rapid maneuvers dramatically changes the nature of safe modes. No longer can a spacecraft just null its rates, point its arrays towards the Sun and phone home. Now, the faulty spacecraft must also ensure that it will not collide with others. Furthermore, it must plan its maneuvers such that if it does experience a fault, the likelihood of collision is minimized. Fault detection, isolation, and recovery (FDIR) is more complex and requires a vigilant on-board software watchdog that reacts to both intra-vehicle as well as inter-vehicle faults and plans according to the consequences. Payload Systems Inc. (PSI), along with its partners at MIT and Intellization, propose an Autonomy and Identification Testbed (SPHERES-AIT) based on the SPHERES platform. SPHERES is a multi-satellite docking laboratory to mature metrology, autonomy, and path-planning algorithms for AR&D in the risk-tolerant yet long duration micro-gravity inside the International Space Station (ISS). This work will mature a modular autonomy software architecture that supports on-orbit self-assembly and spacecraft formation flight using a coordinated terrestrial and ISS laboratory that supports spiral development.

## Primary U.S. Work Locations and Key Partners



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## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Ames Research Center (ARC)

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Aurora Flight Sciences Corporation	Supporting Organization	Industry	Cambridge, Massachusetts

## Primary U.S. Work Locations

California	Virginia
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## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

## Technology Areas

**Primary:**

- TX17 Guidance, Navigation, and Control (GN&C)
  - └ TX17.5 GN&C Systems Engineering Technologies
    - └ TX17.5.2 GN&C Fault Management / Fault Tolerance / Autonomy